weight of the total amount of the allyl-based prepolymer (A), the (meth)acrylate-based compound (B) and the viscosity reducing agent (E).

Examples of the heat polymerization inhibitor include hydroquinone, p-methoxyphenol, tert-butylcatechol, naphthylamine, diphenylpicrylhydrazine, diphenylamine and the like, which work to consuming the forming radicals.

Examples of the chain transfer agent include an α-methylstyrene dimer, 2-mercaptobenzoxazole, 2-mercaptobenzothiazole, tert-butyl alcohol, n-butanol, isobutanol, isopropylbenzene, ethylbenzene, chloroform, methyl ethyl ketone, propylene, vinyl chloride and the like.

In order to prepare the hologram recording material composition, for example, the allyl-based prepolymer (A), the (meth)acrylate-based compound (B), the photo-polymerization initiator (C) and the viscosity reducing agent (E), as well as the optional components described above such as the solvent-soluble thermoplastic resin (D), the additives and the solvent are placed in a vessel resistant to an organic solvent, such as a glass beaker, and the whole content is stirred. In this case, in order to accelerate dissolution of solid components, the composition can be heated to a range in which denaturation of the composition does not occur, such as to a temperature of about from 40 to 90°C.

In order to produce a hologram recording medium by using the hologram recording material composition of the invention, the recording material composition is coated on one surface of a substrate to obtain a recording medium having a two-layer structure consisting of the coated film thus formed, i.e., a recording layer, and the substrate. A three-layer

structure is obtained, if necessary, by placing a protective material in the form of a film, a sheet or a plate to cover the recording layer formed on the substrate. In the process for preparing the composition, a solvent is preferably used. In this case, the allyl-based prepolymer (A), the (meth)acrylate-based compound (B), the photo-polymerization initiator (C) and the viscosity reducing agent (E) are dissolved or suspended in a solvent, and a solution or a suspension thus obtained is coated on a substrate. Thereafter, the solvent is vaporized to obtain a recording layer. In the case where a protective material is placed to cover the recording layer, it is preferred that the solvent is removed by air drying or vaporization under reduced pressure before placing the protective material. The substrate is made of an optically transparent material, such as a glass plate and a plastic plate, such as a polyethylene terephthalate (hereinafter abbreviated as PET) plate, a polycarbonate plate and a polymethyl methacrylate plate. The thickness of the substrate is preferably from 0.5 to 10 mm. The protective material is also made of an optically transparent material as similar to the substrate. The substrate does not necessarily have to be flat, but can be bent or curved and can have an uneven structure on the surface thereof. The thickness of the protective material is preferably from 0.01 to 10 mm. Examples of the coating method include a gravure coating method, a roll coating method and a bar coating method. The coating is preferably conducted in such a manner that the thickness of the recording layer after removing the solvent is from 1 to 100 μm.

In order to record a hologram onto the hologram recording medium, a recording method generally employed can be used. That is, a light source

being excellent in coherence such as laser light is split into two with a beam splitter or the like, one split light is irradiated onto an object to be recorded, and the other is reflected with a reflector as it is. A recording medium is arranged at a specified position. At the position an interference fringe can be caught which is formed with reference light reflected from the reflector and object light reflected from the object. When the object light and the reference light enter the recording medium from the same face, a transmission type hologram is formed. When the object light and the reference light enter from a front face and a rear face respectively, a reflection type hologram is formed. It is unnecessary to use the object to be recorded in the above-mentioned recording method, and in this case, a fringe is formed as grating. Irradiating laser light for about from several seconds to several minutes under such an arrangement, an interference fringe to be a hologram is recorded on the recording medium. The light amount of the laser light used is, in terms of a product of the light intensity and the irradiation time, preferably about from 10 to 10,000 mJ/cm^2. When the light amount is less than the range, recording is difficult to be conduct, whereas when it exceeds the range, the diffraction efficiency of the hologram tends to be lowered, and therefore the both cases are not preferred.

After forming the hologram, a post-processing, such as development and fixing, is not always necessary, but in order to stabilize the resulting image, the medium can be subjected to a irradiation treatment with light on the whole surface thereof or a heat treatment to post-polymerize the remaining unreacted monomer.

A hologram can be copied on a recording medium obtained by using